

War Field Spying Robot

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ABSTRACT: *Today as technical advancements are taking place, these advancements are being used by the armed forces to reduce the risk of their losses and to defeat their enemies. With the development of sophisticated technology it relies mostly on the use of high-tech weapons or machinery. Robotics is one of the hot spheres of modern age in which nations concentrate in the state of war and peace for military purposes. They have been in use for demining and rescue operations for some time now but are being propelled by using them for combat and spy missions. To fulfill and meet the evolving needs of human beings from the manufacturing unit to the robotics and automation unit of the home, a distinct main player has been throughout. This project focuses on creating an RF-based surveillance robot with wireless camera attached to it that can rising the human target. This robot transmits the signal via wireless camera to the base station. One of this project's major application can be analyzed using android-based smart phone that can be used to control the robot's movement. The robot sends the signal through RF transmitter at the base station to the RF receiver mounted on the robot. With this function the robot can relay videos in real time with night vision capabilities and the enemies in the war zone cannot recognize them.*

KEYWORDS: *Wireless, Robot, RF Technology, Transmission, Reception, War, Spy, Surveillance.*

INTRODUCTION

Robotics is the mechanical engineering, electrical engineering and computer science division that deals with robotics design, building, operation and implementation, as well as computer systems for their control, sensory input, and information processing. The aim of developing a high-tech technology is to achieve high-speed technology, advanced robots control capability and computer new control theory methods. Realizing the above requirements requires some technological development along with the need for a high-performance robot to build a quicker, more efficient, more accurate and smarter robot that can be invented by advanced control algorithms, robot control devices and new drivers[1].

The war field surveillance robot may be used for reconnaissance or remote control on enemy territories. At the time of the battle, this surveillance robot can be used to capture and track terrorist information in the far-safe region, and securely construct a counter-attack map. Let us have a short piece of information about how it is seen that a war robot is used to spy. All that is needed is a wireless camera connected to the robot circuit capturing images and recording terrorist videos as well as transmitting the data collected by the TV receiver device[2].

This paper build a simple prototype of this robot which can be remotely controlled and can track and analyze the data transmitted by the camera on a TV.

As its name suggests the spying robot is the one used to spy on enemy territories. Its applications may include:

- During the time of battle, when it can be used to gather information from the enemy terrain and track that information in a far-safe area, and to safely formulate a counter-attack strategy.
- Tracking terrorist group positions, and then planning an attack at an appropriate time.
- Make monitoring of every disaster-affected region where people are unable to travel.

All the following components is needed to design a spying robot on a warfare field apart from a base with wheels and motors.

Sensor Unit – A wireless Night Vision Camera: It consists of a transmitter device apart from what constitutes a simple camera. It collects images and transmits those images in the form of digital signals via the transmitter,

which are processed by the receiver device connected to the TV or computer. The camera can be as far from the receiver as 30 miles away.

A night vision camera can obtain illumination either by amplifying the visible light using image intensifiers or by using objects directly using infrared light – thermal imaging or infrared light reflected by object-near infrared lighting[3].

A Receiver Unit: The robot also consists of a receiver unit that receives the motor control command signals and therefore the robot unit[4].

Actuators: Consists of two DC motors as actuators which provide the robot with reverse and forward movement[5].

Control Unit: This consists of a remote transmitter unit consisting of a microcontroller, encoder, and an RF module and a receiver device installed in the circuit consisting of an RF receiver module, a microcontroller, and a decoder.

The robot-embedded, portable night vision camera consists of a portable transmitter. There is a cluster of IR LEDs that are used to give the image sources IR light. The reason IR light is chosen is that it is typically dark at night time and because every camera requires light for illumination, infrared light is the preferred choice because all objects emit a spectrum of Infrared light. The camera is operated by a 12 V battery and records and transmits these images to the receiver unit that is connected to a television screen. The transmitting unit converts the images to digital signals, and the receiver unit receives these digital signals and transforms them back into pictures, and these pictures or videos are then tracked and analyzed on a TV screen.

RF SECTION

Let's take an RF transmitter that wiggles an electron at one location. This wiggling will cause an effect of ripple, somewhat the same as dropping a pebble within a pond. The effect is an electromagnetic (EM) wave that causes electrons to wiggle in remote locations from the initial location. An RF receiver can detect the wiggling of the distant electron. The RF communication system then makes further use of this phenomenon by wiggling electrons in a particular pattern to reflect information. By establishing a communication with no wires, the receiver can make the same information available at a remote location. A designer has two overriding constraints on most wireless systems: he must operate over a certain distance (range) and transfer a certain amount of information within a time frame (data rate)[6].

L293D [7] is the most widely used driver for the application of bidirectional motor driving. L293D is a 16 pin motor driver IC that drives the motors. The L293D is a dual motor driver with H-bridge. It is capable of driving direct current in any direction. The L293D can control two DC motors in both directions simultaneously. It is used as a current amplifier since input requires low-current control signal and provides high-current signal as output. L293D can also be used for driving both small and large motors. The L293D motor driver is available to provide user-friendly interfacing for embedded applications. It fits easily with any of the systems. It supports for motors with external power supply pins.

How RF Communication Occurs

RF frequency ranges from about 3 kHz to 300GHz. This corresponds to the radio wave frequency and the alternating current that carries the radio signal. It refers to the ac having such characteristics as to generate an electromagnetic field suitable for wireless broadcast and communication if the current is input into an antenna. An antenna must be used for receiving the radio signals. This antenna will pick up thousands of radio signal at a time and there is a need to use a radio tuner to tune in to a specific frequency for the same. It is done by the use of a resonator. Any RF field has a wavelength which is opposite to the frequency. In the atmosphere,

in the outer spaces, or elsewhere in our environment if frequency F is in MHz and wavelength is in meters, then $S=300 / f$. The RF signal frequency is inversely proportional to the wavelength of the EM field it corresponds to. At 9 KHz the wavelength of the free space is approx. 33 Km, or 21 miles (mi). The EM wavelengths measure about one millimeter (1 mm) at the highest radio frequencies. EM energy takes the form of infrared (IR), visible, ultraviolet, X-rays, and gamma rays as the frequency increases beyond the RF spectrum[8].

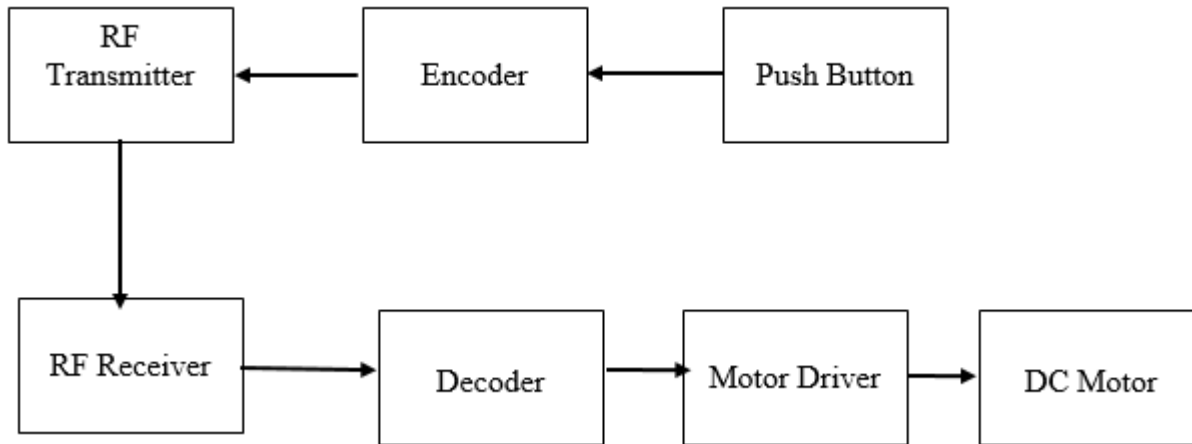


Figure 1: Block Diagram of how the System Works.

Figure 1 illustrate the block diagram of the working of the system. This RF module is 4 bit wireless. Use this to transmit and receive four bits of data through a wireless RF Link. It uses our 433 MHz RF module and the HT12E / D IC. The transmitter and the receiver come with an 8 bit address selector switch that can be used to assign unique addresses to each wireless connection. Receivers only receive data from transmitters that have an 8 bit address that matches. The module will work within 100 m while the transmitter is in line of sight and about 50 m when indoors. This module takes care of all the encoding and decoding needed for data transmission and does not require additional microcontroller computation. Users can hook up the module directly to a micro controller and start transmitting data wirelessly. The transmitter and the receiver can be connected directly via header pins to a microcontroller or an external circuit.

Features of RF

- 100 Meter open space range (Standard Conditions)
- RX Receiver frequency: 433 MHz
- Typical RX Sensitivity: Dbm 105
- RX Current Supply: 3.5 mA
- RX IF frequency : 1MHz
- Low energy consumption
- Easy to implement
- RX Voltage to operate: 5V
- Spectrum TX: 433.92 MHz
- TX Power Voltage: 3V ~ 6V
- TX Out Put power: 4 ~ 12 Dbm

RF Transmitter Pin Description

- Pin 1 — Ground [GND]
- Pin 2 — Serial data input pin [DATA]
- Pin 3 — Power supply; 5v [Vcc]
- Pin 4 — Antenna Output pin [ANT]

RF Receiver

A brief overview on RF 433 MHz Receiver and HT12D (Decoder) is provided in this section individually following the decoder interface with the receiver. This is a Hybrid 433Mhz RF receiver module and is suitable for wireless short-range control applications where efficiency is of primary concern. Except for the antenna the receiver module does not need external RF components. The super-regenerative architecture shows exceptional flexibility at very low cost[9]. Figure 2 shows the used transmitter and receiver images.

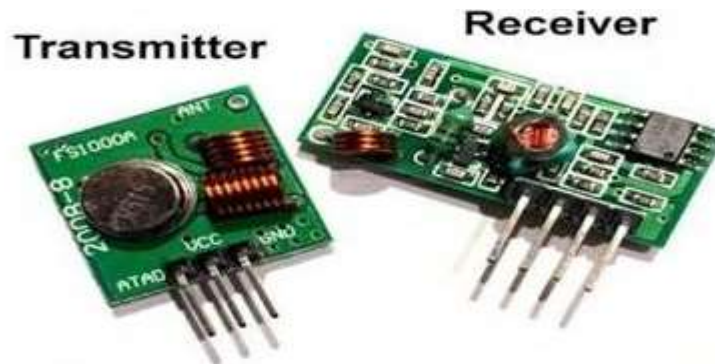


Figure 2: The RF Transmitter and Receiver which are used in the System

Pin Description Of RF Receiver

- Pin1 — Ground [GND]
- Pin 2 — Serial pin with data output [DATA]
- Pin 3 — Linear (Unconnected) output pin [NC]
- Pin 4 — Power supply; 5v [Vcc]
- Pin 5 — Power supply;
- Pin 6 — Ground [GND] 5v [Vcc]
- Pin 7 — Ground [GND]
- Pin 8 — Antenna Input pin [ANT]

Microcontroller Circuit (AT89S52)

It is the heart of the network, since it governs all transmitting and receiving activities. Using AT89S52 IC. The AT89S52 Microcontroller is an 8-bit 8051 series microcontroller with 8 K Bytes of In-System Flash Memory programming. Atmel's high-density, non-volatile memory technology is used for computer production and is compliant with the 80C51 instruction sets of industry standards. The on-chip Flash memory allows in-system reprogramming of the program memory or the use of a conventional non-volatile memory programmer. By combining a versatile 8-bit CPU with in-system programmable Flash on a monolithic chip, Atmel AT89S52 is a powerful microcontroller which provides a cost-effective and highly flexible solution for many embedded control applications. The Idle Mode is used to avoid the CPU while allowing for continued operation of the RAM, serial ports, timer / counters and interrupting system. The Power-down mode is used to save the contents of the RAM, but freezes the oscillator and disables all other chip functions until the next interrupt or hardware reset.

Power Supply

Power supply is the main building block of any electronic device used to supply the power needed for its operation, and it includes +5V for the microcontroller, keyboard, RTC, LCD, GSM, and for driving a buzzer +12V. The power supply delivers regulated +5V output and non-controlled +12 output. The three IC780 terminals provide +5V. The rectification of the main transformer secondary voltage is achieved by condenser

electronic rectifier & filtration. The uncontrolled DC voltage is transmitted to the voltage regulator IC input plate.

Wireless Camera

A wireless CCD camera is used which is usually on the market. This camera operates on supply of 12 volts DC. There is a receiver in the camera, which is positioned in the remote station. Its output is in audio and video signal format. Those signals are sent directly through a tuner card to a television or a computer. Placed on the robot is this CCD camera. The camera collects the audio and video signals and sends those signals to the remote station and will be able to see the recorded signals with the aid of the camera receiver that is connected to the TV or a computer. This is a mini wireless video camera monitoring and wireless receiver system for home and small business surveillance, security and is used for demonstration purposes by us. In the room where user want to track and place the wireless receiver in the next room (up to 15 meters away), the user need to mount the wireless camera and hook it up to a TV or DVR to watch the action or capture the footage for surveillance purposes. Here it is recommended to put this wireless camera into the combat robot that would be present in the warfare field.

SOFTWARE IMPLEMENTATION

Audacity

1. The noise reduction app is available free of charge.
2. It is a free, open, digital audio editor and software application for computer recording, available for Mac OS X , Windows, Linux and other operating systems.
- 3 The unwanted noise can be removed from the receiver end of the audio / video.

RESULT

The system is tested to the best of our ability and are able to properly interpret the events that were happening. In our hearts. Our architecture has caused no disturbances of any sort. This robot will move according to the direction of the motor depending on the input which user offer via remote section unit via the command. With the help of the camera user is able to see the things happening in the field of war where the robot is hidden. The "AUDACITY" import and export features of this project have helped eliminate the unwanted audio signals. By using this software post process, all type of audio including broadcasting is processed by adding effects such as normalizing, trimming fading in and out.

CONCLUSION

The war spying robot's key purpose has been developed to make it user friendly. The spy robot can easily move, capture images, and transmit them wirelessly, thus giving the soldiers an intimation of the warfare dangers and situations. Depending on the direction of the motor, the robot will move based on the input user offer through transmitter (remote) part. RF signals are used as signals for the power. Encoding is done by using these signals & the signal is sent via the transmitter. These decoded signals are given at the receiver end as input to drive the motor. The robot is used for short distance surveillance and thus ensures the region's security. This allows the powers to see the events actually happening in the immediate environment correctly and prepare ahead accordingly. Thus, if necessary, user will be able to control their direction to safely build the robot. A control unit is required for all of that, where RF signal control units are used. Encoding is achieved by using these signals & the signal is transmitted through the transmitter. Such decoded signals are provided at the receiver end as input to drive the motor. It cannot be used as a surveillance robot for long range applications within short distances. Through using Zig-bee with Wi-Fi we can link this device directly to the internet. This can monitor the device via remote position by using the internet. By using Interface software no

simulation tool is required. Halogen light can be used for robot vision. This device can also control by giving it a voice command which makes it a system for speech recognition.

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